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## **CLAIMS**

- 1. A method for ameliorating neuronal atrophy and loss accompanying normal aging in the mammalian brain, the method comprising delivering a unit dosage of a growth factor-encoding transgene composition to preselected delivery sites in the brain, wherein the encoded growth factor is expressed in the brain, and stimulates axonal growth in targeted growth factor-receptive neurons therein.
  - 2. The method according to Claim 1, wherein the targeted growth factor-receptive neurons are cholinergic neurons.
- 3. The method according to Claim 2, wherein the targeted cholinergic neurons are within 550 μm of a delivery site, and wherein further growth is stimulated in said neurons by the expressed growth factor.
  - 4. The method according to Claim 2, wherein terminal axons of targeted cholinergic neurons are located more than 550  $\mu$ m from a delivery site, and wherein further growth is stimulated in said terminal axons by the expressed growth factor.
  - 5. The method according to Claim 1, wherein the growth factor-encoding transgene composition is delivered in vivo, by introduction of a transgene-expressing recombinant expression vector into the brain.
- 6. The method according to Claim 1, wherein the growth factor-encoding transgene composition is delivered ex vivo, from grafts of transgene-secreting donor cells introduced into the brain.
  - 7. The method according to Claim 5, wherein the transgene-expressing recombinant expression vector is a viral vector.

- 8. The method according to Claim 7, wherein the viral vector is delivered in a pharmaceutically acceptable composition, and provides from 10<sup>10</sup> to 10<sup>12</sup> viral particles/ml of composition.
- The method according to Claim 6, wherein the donor cells are delivered in a
  pharmaceutically acceptable composition having a concentration of at least 1 x 10<sup>5</sup> donor cells/μl.
  - 10. The method according to Claim 9, wherein each graft contains from 2 to 20  $\mu$ l of the donor cell containing composition.
- 11. The method according to Claim 1, wherein the mammal is a human and the transgene encodes a human nervous system growth factor.
  - 12. The method according to Claim 11, wherein the transgene encodes nerve growth factor (NGF).
  - 13. The method according to Claim 11, wherein the transgene encodes neurotrophin 3 (NT-3).
- 15 14. The method according to Claim 1, wherein the delivery cell sites are all within the Ch4 region of the cholinergic basal forebrain.
  - 15. The method according to Claim 1, wherein each delivery site is preselected by correlating loss of cortical fiber density to impairment of neurological function in the aging brain.